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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/584,410

06/26/2006

Takuya Tsukagoshi

128532

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25944 7590 01/20/2010

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ALEXANDRIA, VA 22320-4850

EXAMINER

CALLAWAY, JADE R

ART UNIT

PAPER NUMBER

2872

MAIL DATE

DELIVERY MODE

01/20/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/584,410	<b>Applicant(s)</b> TSUKAGOSHI ET AL.	
	<b>Examiner</b> JADE R. CALLAWAY	<b>Art Unit</b> 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 09 December 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,3-8,10,11 and 13-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-8,10,11 and 13-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/9/09 has been entered.

### ***Response to Amendment***

2. The amendments to the claims, in the submission dated 12/9/09, are acknowledged and accepted.

### ***Response to Arguments***

3. Applicant's arguments with respect to claims 1, 3-8, 10-11, and 13-16 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 3-5 and 16 are rejected under 35 U.S.C. 103(a) as unpatentable over Newswanger et al. (6,806,982) in view of Long (2001/0013959) and Moon et al. (2003/0184843).

Consider claims 1 and 16, Newswanger et al. disclose (e.g. figure 1) a holographic recording method for irradiating a layer of a holographic recording medium (RP, recording plate) with an object beam and a reference beam through an object optical system (130, object beam optical system) and a reference optical system (140, reference beam optical system) respectively, so that a data page is of interference fringes, the method comprising: exercising control so that the object beam in the object optical system is reflected in an exposure direction so as to be incident on the holographic recording medium (by means of reflection type SLM); recording data pages by N exposures (via multiple pulse exposure recording) for each data page (e.g. one portion of the holographic recording medium) at (N+1) levels of gradation, with a single exposure time  $t_1$  given by dividing  $t_0$  by N, where  $t_0$  is an exposure time necessary for exposing one of the areas of the recording layer corresponding to a single pixel of the data page as much as approximately 100% and N is an integer of not less than 2; and exposing the area as much as approximately 100% by exposure of N times, as much as 0 by exposure of 0 times and as much as more than 0% and less than 100% by exposure of between 1 and (N-1) times; and the object beam is pulsed (110, pulsed laser) to make a pulsed exposure for the single exposure time  $t_1$  by means of a pulsed light emission from a light source of the object beam and the reference beam [col. 6, lines 53-67, col. 7, lines 1-10, col. 8, lines 21-67, col. 9, lines 1-67, col. 10, lines 1-67, col. 11, lines 1-19]. However, Newswanger et al. do not disclose exercising control of the object optical system between an exposure direction and a non-exposure direction or that each of the areas of the recording layer corresponds to a single pixel of the data

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page. Newswanger et al. and Long are related as holographic devices. Long teaches (e.g. figures 6-7) an exposure apparatus wherein each of the areas of the recording layer can correspond to a single pixel of the data page [0072, 0078-0085]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Newswanger et al., as taught by Long, in order to very accurately control the shape of the exposure area so that the data can be unique for each exposure area.

However, the modified Newswanger et al. reference does not disclose exercising control of the object optical system between an exposure direction and a non-exposure direction. Newswanger et al., and Moon et al. are related as devices including micro mirror arrays. Moon et al. teach (e.g. figures 4a and 4b) exercising control (via 82, micro-mirror device) between an exposure direction (i.e. position shown in figure 4a) and a non-exposure direction (i.e. position shown in figure 4b) [0058]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of the modified Newswanger et al. reference, as taught by Moon et al., in order to selectively control the micro-mirror array to only direct light in an exposure direction when needed and desired.

Consider claim 3, the modified Newswanger et al. reference discloses (e.g. figure 1 of Newswanger et al., and figures 6-7 of Long) a holographic recording method wherein the object beam is pulsed (110, pulsed laser) to make a pulsed exposure for the single exposure time  $t_1$  by means of a pulsed light emission from a light source of the object beam and the reference beam [col. 8, lines 44-67, col. 9, lines 1-33 of

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Newswanger et al.] and by intermittent interruption of an optical path of the object beam (via, 52 shutter of Long) [0085 of Long].

Consider claim 4, the modified Newswanger et al. reference discloses (e.g. figure 1 of Newswanger et al.) a holographic recording method wherein the reflection of the object beam in the exposure direction or in the non-exposure direction is controlled pixel by pixel using a micromirror device (e.g. reflective type SLM or LCD) having an array of micro mirrors corresponding to the respective pixels of the data page [col. 9, lines 58-67, col. 10 lines 1-16]. The micromirrors being switchable and controllable (via a computer system not shown) in the direction of reflection is seen to be inherent in the prior art device. Long also discloses (e.g. figures 6-7) an LCD that has individually addressable elements that can correspond to each pixel of the display [0071 of Long]. The modified Newswanger et al. reference also discloses (e.g. figure 1 of Newswanger et al., and figures 6-7 of Long) a holographic recording method wherein the object beam is pulsed (110, pulsed laser) to make a pulsed exposure for the single exposure time  $t_1$  by means of a pulsed light emission from a light source of the object beam and the reference beam [col. 8, lines 44-67, col. 9, lines 1-33 of Newswanger et al.] and by intermittent interruption of an optical path of the object beam (via, 52 shutter of Long) [0085 of Long].

Consider claim 5, the modified Newswanger et al. reference discloses (e.g. figure 1 of Newswanger et al.) a holographic recording method wherein a beam intensity distribution of the object beam immediately before the reflection is divided into  $(N+1)$  levels of areas; and the number of times of exposure for the time  $t_1$  within the exposure

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time to is controlled with respect to each of the areas so that the object beam after the reflection has a generally-uniform beam intensity distribution (multiple pulse exposure recording) [col. 6, lines 53-67, col. 7, lines 1-10, col. 9, lines 40-67, col. 11, lines 1-19].

6. Claims 6-8, 10-11, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Newswanger et al. (6,806,982) in view of Long (2001/0013959), Mui (2003/0117615) and Moon et al. (2003/0184843).

Consider claim 6, Newswanger et al. disclose (e.g. figure 1) a holographic recording apparatus (100, hologram recorder) comprising: a laser light source (110, pulsed laser); a first polarizing beam splitter (C1, beam splitter cube) for splitting a laser beam from this laser light source into an object beam and a reference beam; an object optical system (130, object beam optical system) for introducing the object beam to a holographic recording medium (RP, recording plate); and a reference optical system (140, reference beam optical system) for introducing the reference beam to the holographic recording medium (RP, recording plate), wherein the object optical system includes: a second beam splitter (C2, beam splitter cube) for transmitting or reflecting the object beam; a reflection type spatial light modulator (SLM) capable of intensity-modulating the object beam transmitted through this second beam splitter with respect to each of pixels of a data page to be recorded, and reflecting it in an exposure direction toward the second beam splitter or in a non-exposure direction different thereto selectively; the object beam reflected by the reflection type spatial light modulator and the second beam splitter interferes with the reference beam in the holographic recording medium, and the reflection type spatial light modulator is configured so that it is capable

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of making  $N$  exposures of each data page (via multiple pulse exposure recording) and capable of most  $N$  times of reflection with respect to each of the areas of the recording layer within an exposure time  $t_0$ , where  $t_0$  is the exposure time necessary for exposing an area of the recording layer corresponding to a single pixel of the data page as much as approximately 100%, a single exposure time  $t_1$  is given by dividing  $t_0$  by  $N$ , and  $N$  is an integer of not less than 2, the reflection type spatial light modulator being further configured to expose the area as much as approximately 100% by exposure of  $N$  times, as much as 0% by exposure of 0 times, and as much as more than 0% and less than 100% by exposure of between 1 and  $(N-1)$  times [col. 6, lines 53-67, col. 7, lines 1-10, col. 8, lines 21-35, col. 9, lines 40-67, col. 11, lines 1-19]. However, Newswanger et al. do not disclose a control unit for controlling the number of times of exposure within the exposure time  $t_0$  with respect to each of the pixels of the reflection type spatial light modulator, the control unit controlling the reflection type spatial light modulation between the exposure direction and the non-exposure direction, that each of the areas of the recording layer corresponds to a single pixel of the data page or that the second beam splitter is a polarizing beam splitter or a quarter-wave plate is arranged on an optical path between the second polarizing beam splitter and the reflection type spatial light modulator. Newswanger et al. and Long are related as holographic devices. Long teaches (e.g. figures 6-7) a control unit (52, shutter and computer) for controlling the number of times of exposure within the exposure time  $t_0$  with respect to each of the pixels of the reflection type spatial light modulator, and an exposure apparatus wherein each of the areas of the recording layer can correspond to a single pixel of the data

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page [0072, 0078-0085]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Newswanger et al., as taught by Long, in order to very accurately control the shape of the exposure area so that the data can be unique for each exposure area.

However, the modified Newswanger et al. reference does not disclose that the second beam splitter is a polarizing beam splitter, that a quarter-wave plate is arranged on an optical path between the second polarizing beam splitter and the reflection type spatial light modulator or that the control unit controls the reflection type spatial light modulator between an exposure direction and a non-exposure direction. Newswanger et al., Long and Mui are related as holographic devices. Mui teaches (e.g. figure 3) a quarter-wave plate (46) arranged on an optical path between a polarizing beam splitter (48) and a reflection type spatial light modulator (44) [0027]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the apparatus of the modified Newswanger et al. reference to include a quarter-wave plate and second polarizing beam splitter, as taught by Mui, in order to select the correct polarization to be used in the apparatus for holographic recording.

However, the modified Newswanger et al. reference does not disclose that the control unit controls the reflection type spatial light modulator between an exposure direction and a non-exposure direction. Newswanger et al., and Moon et al. are related as devices including micro mirror arrays. Moon et al. teach (e.g. figures 4a and 4b) exercising control of the reflective type spatial light modulator (via 82, micro-mirror device) between an exposure direction (i.e. position shown in figure 4a) and a non-

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exposure direction (i.e. position shown in figure 4b) [0058]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of the modified Newswanger et al. reference, as taught by Moon et al., in order to selectively control the micro-mirror array to only direct light in an exposure direction when needed and desired.

Consider claim 7, the modified Newswanger et al. reference discloses (e.g. figure 1 of Newswanger et al.) a holographic recording apparatus wherein the reflection type spatial light modulator (SLM) is made of a micromirror device having an array of micromirrors corresponding to the respective pixels of the data page [col. 9, lines 58-67, col. 10, lines 1-16 of Newswanger et al.]. The micromirrors being switchable and controllable (via a computer system not shown) in the direction of reflection is seen to be inherent in the prior art device.

Consider claim 8, the modified Newswanger et al. reference discloses (e.g. figure 1) a holographic recording apparatus wherein the laser light source (110, pulsed laser) is capable of pulsed light emission with a specified pulse width [col. 8, lines 44-67, col. 9, lines 1-67, col. 11, lines 1-16 of Newswanger et al.]. However, the modified Newswanger et al. reference does not disclose that the light source is pulsed with a pulse width that is generally the same width as the single exposure time  $t_1$  of the reflection type spatial light modulator. Note that the Court has held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation; see **In re Aller, 220 F.2d 454, 456, 105 USPQ 223, 235**. It would have been obvious to a person of ordinary skill

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in the art at the time the invention was made to set the pulse width to be the same width as a single exposure time  $t_1$  to the reflection type spatial light modulator, in order to increase the diffraction efficiency of recorded holograms.

Consider claims 10-11, the modified Newswanger et al. reference discloses (e.g. figures 1, 7 of Long) a holographic recording apparatus wherein the control unit is configured to control the number of times of exposure within the exposure time to pixel by pixel so that a beam intensity distribution after the reflection by the reflection type spatial light modulator becomes generally uniform (by multiple pulse exposure recording of Newswanger et al.) [0045-0046, 0056, 0084-0085 of Long; col.6, lines 53-67, col. 7, lines 1-10 of Newswanger et al.].

Consider claims 13-15, the modified Newswanger et al. reference discloses (e.g. figures 1-7 of Long) a holographic recording apparatus wherein the control unit (52, shutter and computer) is configured to control the number of times of exposure so that the object beam after the reflection becomes generally uniform in intensity, based on beam intensity distribution information on each area when the beam intensity distribution of the object beam immediately before incident on the reflection type spatial light modulator is divided into  $(N+1)$  levels of areas (by means of multiple pulse exposures of Newswanger et al.) [0045-0046, 0056, 0084-0085 of Long].

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JADE R. CALLAWAY whose telephone number is

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(571)272-8199. The examiner can normally be reached on Monday to Friday 6:00 am - 3:30 pm est.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JRC  
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